MASTER
NEGATIVE
NO. 95-82342-3

COPYRIGHT STATEMENT

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted materials including foreign works under certain conditions. In addition, the United States extends protection to foreign works by means of various international conventions, bilateral agreements, and proclamations.

Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specified conditions is that the photocopy or reproduction is not to be "used for any purpose other than private study, scholarship, or research." If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of "fair use," that user may be liable for copyright infringement.

The Columbia University Libraries reserve the right to refuse to accept a copying order if, in its judgement, fulfillment of the order would involve violation of the copyright law.

Author:
U.S. Federal Power Commission

Title:
Electric utility cost units, steam electric...

Place:
Washington, D.C.

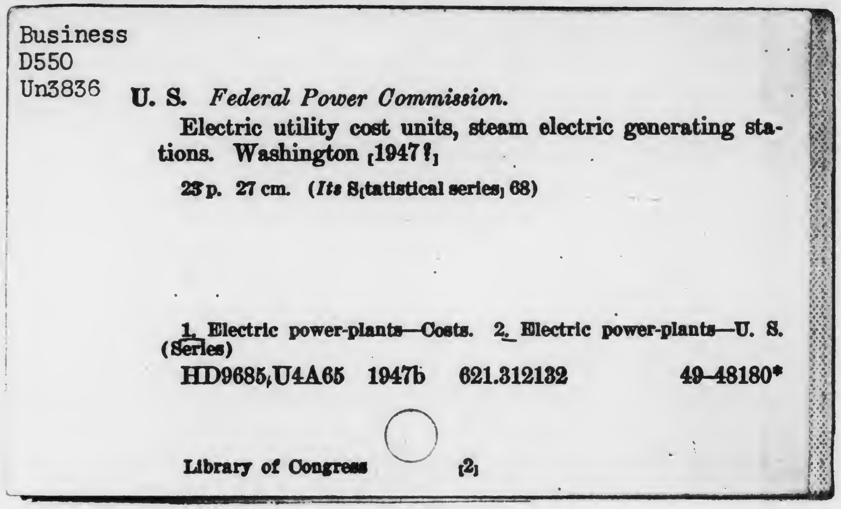
Date:
[1947]

95-82342-3
MASTER NEGATIVE #

COLUMBIA UNIVERSITY LIBRARIES
PRESERVATION DIVISION

BIBLIOGRAPHIC MICROFORM TARGET

ORIGINAL MATERIAL AS FILMED - EXISTING BIBLIOGRAPHIC RECORD



Business
D550
Un3836

U. S. *Federal Power Commission.*
Electric utility cost units, steam electric generating stations. Washington [1947?]
23 p. 27 cm. (*Its* S[tatistical series] 68)

1. Electric power-plants—Costs. 2. Electric power-plants—U. S. (Series)
HD9685.U4A65 1947b 621.312132 49-43180*

Library of Congress [2]

RESTRICTIONS ON USE:

TECHNICAL MICROFORM DATA

FILM SIZE: 35mm

REDUCTION RATIO: 16X

IMAGE PLACEMENT: IA [✓ IIA] IB IIB

DATE FILMED: 2-1-95

INITIALS: PB

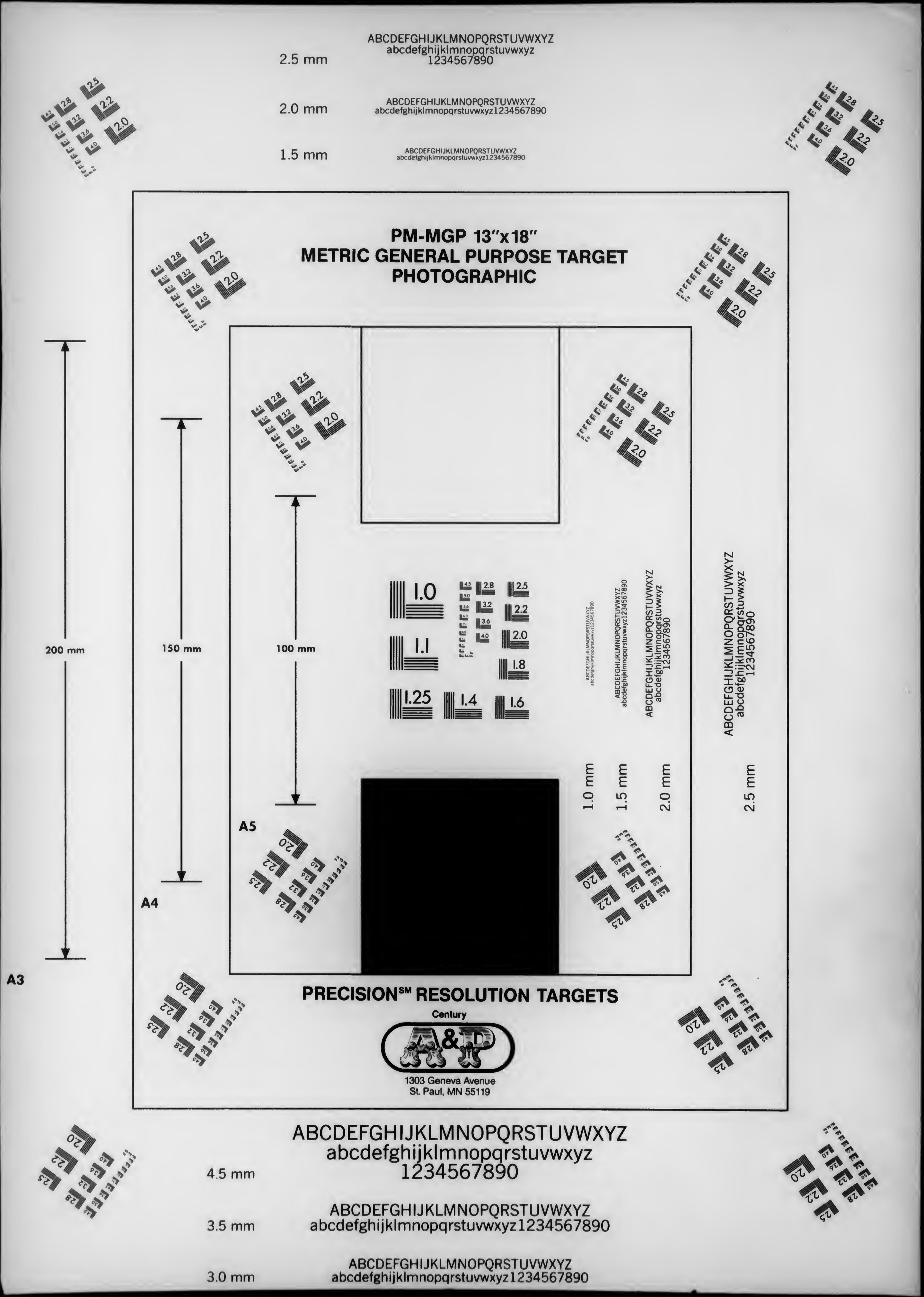
TRACKING # : MSH 03749

FILMED BY PRESERVATION RESOURCES, BETHLEHEM, PA.

2.5 mm ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

2.0 mm ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

1.5 mm ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890



PM-MGP 13"x18"
METRIC GENERAL PURPOSE TARGET
PHOTOGRAPHIC

1.0 mm ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

1.5 mm ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

2.0 mm ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

2.5 mm ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

PRECISION℠ RESOLUTION TARGETS

Century
A&P
1303 Geneva Avenue
St. Paul, MN 55119

4.5 mm ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

3.5 mm ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

3.0 mm ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567890

U.S. Federal Power Commission.
Electric utility cost units. Steam electric generating stations.

D550 - Un 3836

Columbia University
in the City of New York

THE LIBRARIES

GRADUATE
SCHOOL OF BUSINESS
LIBRARY

S-68

Duc

ELECTRIC UTILITY COST UNITS

STEAM ELECTRIC GENERATING STATIONS

U.S FEDERAL POWER COMMISSION

ELECTRIC UTILITY COST UNITS

STEAM ELECTRIC GENERATING STATIONS

FEDERAL POWER COMMISSION

For sale only by the Federal Power Commission, Washington 25, D. C.
Price 25 Cents

When ordering, this publication may be referred to as F.P.C. S-68

Business
D550
Un3836

FEDERAL POWER COMMISSION

NELSON LEE SMITH, *Chairman*
CLAUDE L. DRAPER, *Vice Chairman*
THOMAS C. BUCHANAN
LELAND OLDS
HARRINGTON WIMBERLY

LEON M. FUQUAY, *Secretary*

MAY 10 1957 FD

TABLE OF CONTENTS

Page
FOREWORD 1

PART I - INVESTMENT UNITS
  Effect of Size of Station on Unit Costs 2
  Range of Unit Construction Costs 2
  Construction Costs Related to Date of Installation . 4
  Thermal Efficiency Related To Date of Installation . 5
  Effect of Geographical Location on Unit Costs 6

PART II - PRODUCTION EXPENSE UNITS
  Production Expenses Related to Average Annual Plant Factor 8
  Production Expenses Related to Station Size 10
  Effect of Station Size on Thermal Efficiency 10
  Production Expenses Related to Age of Station 12

APPENDIXES 16

FOREWORD

This study of steam electric generating station investment and production expenses is based on data reported to the Federal Power Commission by privately owned Class A and Class B electric utilities for the year 1946.

The study provides data permitting comparison of construction and operating costs of individual stations with the experience of the industry in general. Costs are developed in considerable detail as to items covered and analyses of individual items have been extended to permit expression of costs under varying conditions of operation. For example, construction costs are related to station size, date of installation, thermal efficiency, and geographical location. Average costs of land, structures and improvements, and equipment, as well as total costs, are shown. Production expenses are related to station size, annual plant factor, thermal efficiency and date of installation. Component expenses analyzed include supervision and engineering expenses, station labor expenses, fuel expenses, water, supplies and expenses, and maintenance expenses.

Preparation of the study involved analyses of data reported for 650 steam electric generating stations. The combined capacity of these stations comprises in excess of 99 percent of the total privately owned utility steam electric generating capacity in the United States. Data included in the individual sections have been limited, however, to those which appear to be fully and accurately presented in the company reports. The studies, therefore, constitute an assembly and analysis of data as reported without introduction of estimates.

PART I

INVESTMENT UNITS

The average book cost of steam electric generating stations ranges from approximately $175 per kilowatt of station capacity for small stations of less than 1,000 kilowatts to approximately $95 per kilowatt for large stations of over 100,000 kilowatts. Of the total cost of generating stations, the cost of equipment is the largest item by a considerable margin, representing on the average approximately 73 percent of total cost while structures and land represent about 25 percent and two percent, respectively.

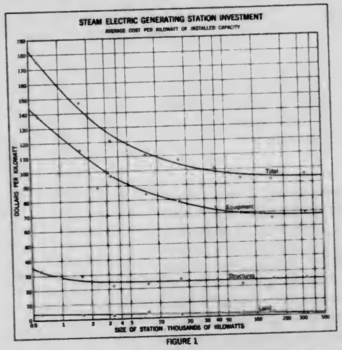


FIGURE 1

As will be seen, there are, among individual stations, wide deviations from the average unit costs cited above. In addition to size of station, unit construction costs are affected by such factors as price levels existing during the period of station construction, a circumstance which, of course, exercises a marked effect on construction costs at the present time; location of station; and technological advances in the production of power by steam, as reflected in station design and type of equipment employed. The degree to which these factors influence costs of steam electric stations is discussed below and on succeeding pages.

EFFECT OF SIZE OF STATION ON UNIT COSTS

The effect of station size on the principal components of station construction costs and on total costs is shown in Figure 1. It will be noted that as size of station increases, average total costs decrease quite rapidly from approximately $185 for stations of 500 kilowatts capacity to $120 for stations of 5,000 kilowatts, and somewhat less rapidly to approximately $100 for stations of 25,000 kilowatts. Beyond 25,000 kilowatts, the decrease in average unit costs is relatively slight and an apparent minimum average cost of $95 per kilowatt is reached as station size approaches 200,000 kilowatts.

The decrease in total average costs per kilowatt of capacity as station size increases reflects principally economies in costs of equipment. It will be observed from Figure 1 that average unit costs of equipment decrease from approximately $145 for 500 kilowatt stations to approximately $70 for stations of over 100,000 kilowatts. Thus, of the entire decrease of $90 in total average unit costs as station size increases from 500 kilowatts to 100,000 kilowatts, the decrease in equipment unit costs represents $75 or approximately 85 percent of the total.

Except for a very narrow range in the smaller size stations, the average costs of station structures are in almost direct proportion to size of station. It will be noted that average structure costs decrease from approximately $35 per kilowatt for stations of 500 kilowatts to approximately $25 per kilowatt for stations of 5,000 kilowatts but that beyond 5,000 kilowatts, average unit costs are approximately constant. The cost of land, it will be observed, decreases quite consistently from an average of approximately $4 per kilowatt for very small stations to approximately $1 per kilowatt for very large stations.

The curves shown in Figure 1 are based on data contained in Appendix I. In the elements of cost, land includes land and land rights; structures include structures and improvements; and equipment includes boiler plant equipment, engine and engine driven generators, turbogenerator units, accessory electric equipment, and miscellaneous power plant equipment. Included in the study are 270 stations with a total capacity of approximately 20,000,000 kilowatts.

RANGE OF UNIT CONSTRUCTION COSTS

As stated previously, there are many factors other than size of station which effect variations in unit construction costs. The considerable influence of these factors, as evidenced by the wide range in costs of stations of the same size, is shown in Figure 2. The central curve in the figure represents the average total unit costs of all stations as shown in Figure 1. The outer limits of the shaded area represent the average costs of stations having costs higher and stations having costs lower than the average of all stations. The curves above and below the limits of the shaded area are drawn through points representing, respectively, the maximum cost and minimum cost occurring in each of the nine station size groups. As will be observed, there is a considerable degree of consistency in the pattern of all five curves.

Referring to Figure 2, it will be noted that average costs of stations costing more than the average of all stations range from approximately $240 per kilowatt for 500 kilowatt stations to approximately $108 per kilowatt for stations of over 100,000 kilowatts. For stations costing less than the average of all stations, average unit costs range from approximately $160 for 500 kilowatt stations to approximately $80 for stations of over 100,000 kilowatts. Percentage differences between the average costs of the higher cost and the average costs of the lower cost stations range from approximately 50 percent for the smaller stations to approximately 35 percent for the larger stations.

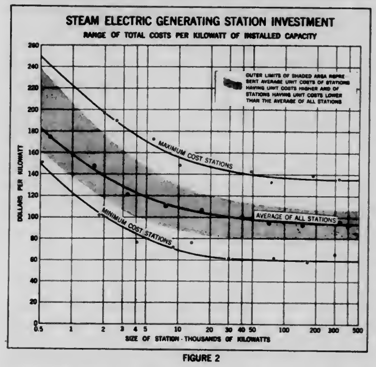


FIGURE 2

Also of interest are the wide deviations between the maximum cost and the minimum cost stations. In general, unit costs of the maximum cost stations are more than 100 percent higher than unit costs of the minimum cost stations. For example, unit costs of 5,000 kilowatt stations range from approximately $80 to $170. For stations of over 25,000 kilowatts, unit costs range from approximately $60 to $140.

Because of this extreme range in unit construction costs, it is of interest to compare characteristics of high cost stations with those of low cost stations. To this end, there are shown in Table 1 for each of the ten highest cost stations and for each of the ten lowest cost stations included in the study, data as to location, time of installation, unit costs, plant factor, thermal efficiency, and type of fuel used.

Examination of the data shown in Table 1 will disclose that the principal differences indicated therein, between the two groups of stations, are in time of station installation and in location of station. As will be observed later in the discussion, the effect on unit costs of differences in these factors is sufficient to explain the difference between average costs of stations costing more than the average of all stations and average costs of stations costing less than the average of all stations.

Referring to Table 1, it will be noted that of the ten high cost stations, nine stations were constructed during the years 1911 to 1930 and that nine of the stations are located in the North. Of the low cost stations, six stations were constructed during the years 1931 to 1946 and six stations are located in the South. It is of interest that these low cost stations display on the average a higher thermal efficiency than the high cost stations, even though operating at a somewhat lower weighted average plant factor. The implication here that the later period, 1931 to 1946, witnessed economies in construction and design which made possible not only less costly stations but more efficient stations is

TABLE I

MAXIMUM COST AND MINIMUM COST STATIONS

(STATIONS OF OVER 25,000 KW CAPACITY)

COST PER KW				CAPACITY KW	STATION LOCATION(1)	TIME OF INSTALLATION(2)	ANNUAL PLANT FACTOR - 1946 PERCENT	AVERAGE BTU PER KWH NET GENERATION-1946	KIND OF FUEL
TOTAL	LAND	STRUCTURES	EQUIPMENT						
					MAXIMUM COST STATIONS				
$142	$1	$24	$117	48,000	North Central	1911 - 1930	69	14,580	Coal, Gas, Oil
139	4	44	91	187,500	North Central	1911 - 1930	34	18,803	Coal
139	7	39	93	35,500	Southeast	1911 - 1930	34	19,324	Oil
138	1	41	96	30,000	East Central	1911 - 1930	31	21,164	Coal
137	3	36	98	116,000	Northeast	1911 - 1930	46	17,101	Coal, Oil
136	5	40	91	323,000	Northeast	1931 - 1946	51	13,579	Coal, Oil
136	5	31	100	46,000	Northeast	1911 - 1930	46	23,729	Coal, Oil
133	*	27	106	75,000	Northeast	1911 - 1930	66	13,404	Coal, Oil
129	2	48	79	186,750	Northeast	1911 - 1930	39	19,190	Coal
129	6	31	92	83,000	Northeast	1911 - 1930	71	19,016	Coal
$136	$4	$39	$ 92	113,075			48	16,600	
					MINIMUM COST STATIONS				
$ 68	*	$15	$ 53	120,000	Southeast	1931 - 1946	51	12,581	Coal, Gas
67	1	18	48	55,000	Northeast	1931 - 1946	6	33,886	Coal
66	1	14	51	305,000	Northeast	1911 - 1930	30	17,700	Coal
65	1	16	48	102,000	East Central	1911 - 1930	39	18,749	Coal
64	*	13	51	180,000	Southeast	1931 - 1946	54	14,249	Coal, Gas
63	3	14	46	50,740	Northeast	1911 - 1930	34	28,264	Coal
62	*	14	48	80,000	Southeast	1931 - 1946	69	11,765	Coal
62	*	21	41	30,000	Southeast	1911 - 1930	12	27,524	Coal
60	*	15	45	190,000	Southeast	1931 - 1946	51	13,636	Coal
58	*	15	43	165,000	Southeast	1931 - 1946	59	13,762	Coal
$ 63	$1	$15	$ 47	127,774			44	18,100	

(1) See Table 5 for states included in indicated regions.
(2) Over 50 percent of total station capacity installed during period indicated.
* Less than $1.00.

discussed more fully below, as well as the effect on average unit costs of geographical location.

With respect to the component costs of the two groups of stations, the wide range in equipment costs is somewhat surprising, amounting on the average, as shown in the table, to approximately 100 percent. Average costs of structures of the high cost stations are approximately 150 percent higher than for the low cost stations. The cost of land varies widely among individual stations but has, as may be observed, relatively slight effect on total station costs.

CONSTRUCTION COSTS RELATED TO DATE OF INSTALLATION

Of particular interest at the present time is the effect of current high price levels on unit costs of steam electric stations. However, because comparatively little capacity has been installed in recent years, the books of reporting utilities do not reflect to any extent as yet existing construction costs.

With respect to entirely new stations, there are shown in Table 2, for each of the three stations installed subsequent to 1943 for which data are available, unit costs and 1946 plant factor and thermal efficiency. Although the small sample precludes general comparison, it will be noted that costs of two stations are somewhat higher than overall average book costs of stations of corresponding capacities and that station thermal efficiencies are relatively high except for the station which operated at a 34 percent plant factor.

The costs of capacity added during the years 1946 and 1945 to already existing stations are shown in Table 3. Because in some instances previous provision had been made for the additional capacity, the costs shown do not reflect the entire cost of such additions. This is particularly true with respect to the data shown for the year 1945 during which, as will be noted, capacity was added at an average cost of $83 per kilowatt to stations which previously cost on the average $96 per kilowatt. During the year 1946, capacity was added at an average cost of $153 per kilowatt to stations which previously cost on the average $110 per kilowatt. The average unit cost of equipment added to these stations was approximately 60 percent higher than the average cost of equipment already installed.

Current high price levels are reversing a trend towards lower cost, although more efficient, stations that has persisted over a considerable number of years. As shown in Appendix II, the average cost of stations of over 25,000 kilowatts installed during the period 1911 to 1930 amounts to approximately $97 per kilowatt. For stations of over 25,000 kilowatts installed from 1931 to 1946, the average cost is only $86 per kilowatt, or approximately 13 percent lower than for the earlier period. Analysis of the heat consumption rates of the two groups of stations for the year 1946 discloses that the later and less costly stations achieved on the average an economy of approximately 12,400 Btu per net kilowatt-hour generated as compared to approximately 16,400 for the earlier more costly stations.

TABLE 2

UNIT COSTS OF STATIONS RECENTLY INSTALLED

STATION LOCATION	YEAR INSTALLED	CAPACITY KW	COST PER KW				ANNUAL PLANT FACTOR - 1946 PERCENT	AVERAGE BTU PER KWH NET GENERATION-1946
			LAND	STRUCTURES	EQUIPMENT	TOTAL		
OHIO	1945	100,000	$1	$32	$81	$114	79	11,466
FLORIDA	1944	22,500	1	24	72	97	78	12,873
NEW MEXICO	1944	10,000	*	30	81	111	34	17,677

* Less than $1.00.

TABLE 3

AVERAGE UNIT COSTS OF CAPACITY RECENTLY ADDED TO EXISTING STATIONS

NO. OF STATIONS	CAPACITY ADDED		COST PER KW OF ADDITIONS				STATION COST PER KW PRIOR TO ADDITIONS			
	TOTAL	PER STATION	LAND	STRUCTURES	EQUIPMENT	TOTAL	LAND	STRUCTURES	EQUIPMENT	TOTAL
				CAPACITY ADDED DURING 1946						
7	123,500	17,643	*	$ 24	$ 129	$ 153	$2	$ 27	$ 81	$ 110
				CAPACITY ADDED DURING 1945						
5	169,760	33,952	*	$ 17	$ 66	$ 83	$4	$ 24	$ 68	$ 96

* Less than $1.00.

In Figure 3, which is based on data contained in Appendix II, the range in unit costs of stations constructed during each of the two periods described above are shown by means of cumulative frequency curves. It will be observed that the median cost of stations installed during the later period is approximately $84 per kilowatt which is somewhat lower than the average cost of these stations; for stations installed during the earlier period, both median and average costs are $97 per kilowatt. A general trend towards lower construction costs during the later period also may be noted. For example, approximate readings from the curves in the figure show that 40 percent of the capacity installed from 1931 to 1946 cost less than $80 per kilowatt as compared to only about 20 percent of the capacity installed prior to 1931; conversely, only six percent of the capacity installed during the later period cost more than $110 per kilowatt as compared to 20 percent of the capacity installed during the earlier period.

The lower unit costs which were achieved during the years from 1931 to 1946 were due in part, of course, to the low price levels which existed during the early 1930's. However, of the 26 stations included in the group representing this period, 12 stations were installed between the years 1940 and 1946, a period during which published utility construction cost indices were higher than at any time between 1911 and 1930. The median cost of these 12 stations is only $86 per kilowatt, just slightly higher than the median cost of all stations installed from 1931 to 1946 and still considerably below the median cost of stations installed prior to 1931.

In Figure 3 and in Appendix II, the data are restricted to stations of over 25,000 kilowatts capacity in order that the influence on average unit costs of station size would be at a minimum and thereby allow the effect of date of construction to be more clearly indicated. The data are further restricted to stations which had at least 75 percent of total capacity installed during the indicated period.

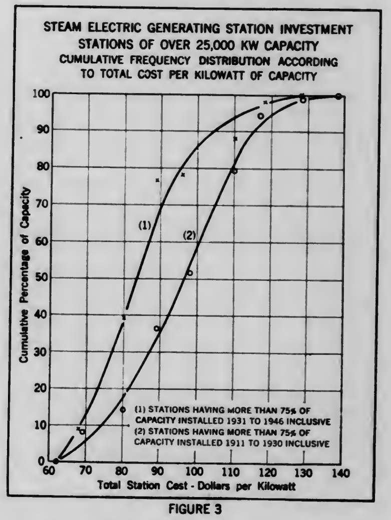


FIGURE 3

THERMAL EFFICIENCY RELATED TO DATE OF INSTALLATION

As indicated previously, the stations installed during the period from 1931 to 1946 are not only less costly, but achieve higher thermal efficiencies than the stations installed prior to 1931. This gain in thermal efficiency is shown quite clearly in Table 4, in which the stations included in each of the two age groups are classified according to their average heat consumption rates during the year 1946. It will be observed that 86 percent of the capacity installed during 1931 to 1946 attained an economy of better than 14,000 Btu per net kilowatt-hour generated as compared to only about 32 percent of the capacity of the earlier group. Moreover, less than one percent of the capacity of the later group displayed a rate of more than 16,000 Btu per net kilowatt-hour generated as compared to approximately 20 percent of the capacity of the earlier group. It will be noted also that for stations displaying comparable rates of heat consumption, average equipment costs for stations installed during the later period are in all cases lower than for stations installed during the earlier period. Further reference to the table will show that for each of the two age groups an increase in thermal efficiency is reflected in somewhat higher average equipment costs. However, entirely different stations are included in each classification and the incremental costs indicated must therefore be accepted as approximations.

In order that the relation of date of installation on average heat consumption might be more clearly indicated, the stations included in Table 4 are restricted to stations of over 25,000 kilowatts and which operated during the year 1946 at more than 50 percent average plant factor. Because of the reduced sample it was necessary, therefore, to include stations which had only a majority of capacity installed during the indicated period instead of confining the data to stations which had at least 75 percent of capacity installed during the indicated period, as in Figure 3 and Appendix II. It is of interest that the effect of reducing the differential as to age between the two groups of stations is to reduce also the differential as to costs. In Table 4, it will be noted, average unit equipment costs of the later group and of the early group are approximately $68 and $72, respectively, whereas average unit equipment costs of stations included in Figure 3 and Appendix II are approximately $62 and $70, respectively.

EFFECT OF GEOGRAPHICAL LOCATION ON UNIT COSTS

As noted in Table 1, which shows the location of the maximum cost and minimum cost stations included in the study, a preponderant number of the maximum cost stations are located in the North and a preponderant number of the minimum cost stations are located in the South. This tendency towards higher costs in the North is further analyzed in Table 5, in which the data are classified according to both time of station installation and location of station. The data are restricted to stations located east of the Mississippi River because cost data available for stations located elsewhere are not sufficient for purposes of comparison.

With respect to stations installed during the period 1911 to 1930, it will be observed that average costs vary but little in the various regions of the North. However, average total costs and average costs of both structures and equipment are higher in all regions of the North than in the South. Total average costs in the North are approximately 20 percent higher, while average equipment costs and average structure costs are, respectively, approximately 23 percent and 18 percent higher.

With respect to stations installed during the period 1931 to 1946, average costs in the North Central region, it will be noted, are somewhat higher than average costs in other northern regions. However, as in the case of stations installed during 1911 to 1930, average costs in all regions of the North are somewhat higher than in the South. Approximate percentage differences between South and North are for total costs, 24 percent; for equipment costs, 17 percent; and for structure costs, 44 percent.

TABLE 4

AVERAGE UNIT COSTS OF STATION EQUIPMENT

STATIONS CLASSIFIED ACCORDING TO TIME OF INSTALLATION AND THERMAL EFFICIENCY

(STATIONS OF OVER 25,000 KW CAPACITY OPERATING AT MORE THAN 50% ANNUAL PLANT FACTOR)

AVERAGE BTU PER KWH NET GENERATION-1946	STATIONS INSTALLED 1911 TO 1930*					STATIONS INSTALLED 1931 TO 1946*				
	NO. OF STATIONS	CAPACITY			COST OF EQUIPMENT PER KW	NO. OF STATIONS	CAPACITY			COST OF EQUIPMENT PER KW
		KW	PERCENT OF TOTAL	CUMULATIVE PERCENT			KW	PERCENT OF TOTAL	CUMULATIVE PERCENT	
10,001 – 12,000	–	–	–	–	–	8	1,193,200	22.3	22.3	$77
12,001 – 14,000	6	1,135,000	32.4	32.4	$74	20	3,406,000	63.7	86.0	67
14,001 – 16,000	14	1,677,740	47.9	80.3	72	7	711,400	13.3	99.3	61
16,001 – 18,000	4	520,000	14.8	95.1	70	–	–	–	–	–
18,001 – 20,000	1	87,500	2.5	97.6	69	–	–	–	–	–
20,001 – 22,000	2	85,250	2.4	100.0	70	1	39,000	0.7	100.0	59
TOTAL	27	3,505,490	100.0		$72	36	5,349,600	100.0		$68

* Over 50 percent of total station capacity installed during period indicated.

In Table 5, the combined effect on average unit costs of differences in location and date of installation may be observed. It will have been noted that the highest cost stations are, on the average, those installed during 1911 to 1930 and located in the North. The lowest cost stations are, on the average, those installed during 1931 to 1946 and located in the South. Comparison of the total average costs of these two groups of stations will disclose a difference of approximately 40 percent which compares generally with the difference, shown in Figure 2, between the average costs of stations costing more than the average of all stations and the average cost of stations costing less than the average of all stations.

TABLE 5

AVERAGE UNIT COSTS

STATIONS CLASSIFIED ACCORDING TO TIME OF INSTALLATION AND LOCATION

(STATIONS OF OVER 25,000 KW CAPACITY LOCATED EAST OF THE MISSISSIPPI RIVER)

REGION(2)	NUMBER OF STATIONS	CAPACITY-KW		AVERAGE COST PER KW			
		AMOUNT	PER STATION	LAND	STRUCTURES	EQUIPMENT	TOTAL
STATIONS INSTALLED 1911-1930 INCLUSIVE(1)							
NORTHEAST	19	2,365,440	124,497	$2	$25	$71	$98
EAST CENTRAL	11	1,159,000	105,364	2	26	70	98
NORTH CENTRAL	8	1,430,550	178,819	1	27	70	98
TOTAL NORTH	38	4,954,990	130,394	2	26	70	98
SOUTH	6	250,900	41,817	3	22	57	82
TOTAL	**44**	**5,205,890**	**118,316**	**$2**	**$25**	**$70**	**$97**
STATIONS INSTALLED 1931-1946 INCLUSIVE(1)							
NORTHEAST	7	928,000	132,571	$1	$20	$63	$84
EAST CENTRAL	9	1,292,000	143,556	2	25	61	88
NORTH CENTRAL	5	385,500	77,100	1	26	67	95
TOTAL NORTH	21	2,605,500	124,071	1	23	63	87
SOUTH	3	230,000	76,667	*	16	54	70
TOTAL	**24**	**2,835,500**	**118,146**	**$1**	**$23**	**$62**	**$86**

(1) Over 75 percent of total station capacity installed during period indicated.

(2) NORTHEAST –Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Eastern Pennsylvania, Maryland, District of Columbia.

EAST CENTRAL –Western Pennsylvania, West Virginia, Michigan, Ohio, Indiana, Kentucky.

NORTH CENTRAL–Illinois, Wisconsin, Eastern Minnesota.

SOUTH –Virginia, North Carolina, South Carolina, Tennessee, Georgia.

Less than $1.00.

PART II

PRODUCTION EXPENSE UNITS

Average annual production expenses of steam electric generating stations range from approximately 6.75 mills per kilowatt-hour net generation for small stations of less than 10,000 kilowatts to approximately 4.25 mills per kilowatt-hour for large stations of over 50,000 kilowatts. Of the total operating costs of producing power, the cost of fuel is the largest item, representing on the average approximately 74 percent of total costs, while station labor and maintenance each represent approximately 11 percent. Of the remaining four percent, water, supplies and expenses account for approximately 2.5 percent and supervision and engineering 1.5 percent.

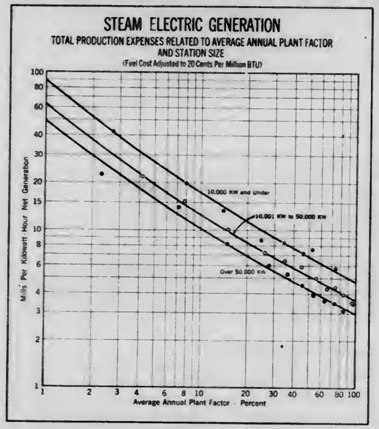

STEAM ELECTRIC GENERATION
TOTAL PRODUCTION EXPENSES RELATED TO AVERAGE ANNUAL PLANT FACTOR AND STATION SIZE
(Fuel Cost Adjusted to 20 Cents Per Million BTU)

Figure 4

Production expenses vary inversely, of course, with plant factor. The figures cited above represent average unit costs at an annual plant factor of 50 percent. This is approximately the over-all average annual plant factor for the year 1946 of all privately owned steam electric generating stations.

For purpose of comparing production expenses of individual stations with average expenses of the industry under varying conditions of operation, fuel costs of all stations represented in the study have been adjusted to a common basis of 20 cents per million BTU. Such cost is equivalent to $5.20 per ton of coal having heat content of 13,000 BTU per pound. Average cost of coal, and coal equivalent in other fuels, consumed by all electric power stations in the United States during the year 1946 amounted to approximately $4.90 per ton.

Because the major proportion of steam station capacity is located in the North, labor costs represented in the study reflect principally the higher wage rates prevailing in that area. According to data published by the United States Department of Labor, hourly earnings of utility plant workers at the beginning of 1946 were on an average about 22 percent higher in the North than in the South.

Effects on production expenses of station size, annual plant factor and age of station are examined in the following discussion and accompanying figures and tables. The study is based on data reported for 396 steam electric generating stations. The combined capacity of these stations is approximately 27,000,000 kilowatts and includes in excess of 85 percent of the steam electric generating capacity of the privately owned electric utility industry as of December 31, 1946.

PRODUCTION EXPENSES RELATED TO AVERAGE ANNUAL PLANT FACTOR

Average annual production expenses per kilowatt-hour of various size stations operating at various average annual plant factors are shown in Figure 4. The station size groups are 10,000 kilowatts and under, 10,001 to 50,000 kilowatts, and over 50,000 kilowatts. The average size of the stations in each group is, respectively, 5,932 kilowatts, 27,750 kilowatts, and 157,463 kilowatts; for convenience they are referred to as small, medium and large stations. Data used in preparation of the figure are contained in Appendix III.

As may be observed from Figure 4 the decrease in average unit production expenses as plant factor increases is most rapid at the lower plant factors. Beyond the lower plant factors, average unit costs continue to decrease, even at very high plant factors, but at a less rapid absolute rate. For example, the absolute decrease in average unit expenses of the large stations as plant factor increases from five percent to 10 percent is approximately 5.6 mills as compared to only about 0.8 mills as plant factor increases from 60 percent to 100 percent. However, the percentage rate of decrease in average

unit expenses is comparatively uniform, diminishing only slightly with regular percentage increases in the plant factor. Because the scales employed in Figure 4 are logarithmic, the shape of the curves presented indicate this percentage rate of decrease rather than the absolute rate of decrease. Approximate readings from the curve for large stations at plant factors successively doubled are shown in the following tabulation.

PLANT FACTOR	TOTAL PRODUCTION EXPENSES	DECREASE IN MILLS PER KWH AS PLANT FACTOR INCREASES	
PERCENT	MILLS PER KWH	AMOUNT	PERCENT
2.5	25.26		
5	15.83	9.43	37
10	10.24	5.59	35
20	6.85	3.39	33
40	4.72	2.13	31
80	3.33	1.39	29

Average component production expenses of large stations at successively doubled plant factors are shown below. It may be observed that up to 10 percent plant factor, the largest decrease is in the cost of station labor. Beyond 10 percent plant factor, economies in fuel expenses are of most significance. The figures given represent approximate readings from curves similar to those presented in Figure 4. Readings from curves for all station size groups are contained in Appendix IV.

MILLS PER KILOWATT-HOUR

PLANT FACTOR PERCENT	SUPERVISION AND ENGINEERING	STATION LABOR	FUEL	WATER, SUPPLIES AND EXPENSES	MAINTENANCE
2.5	0.94	7.69	9.61	0.71	6.31
5	0.52	4.00	7.40	0.44	3.47
10	0.28	2.08	5.70	0.27	1.91
20	0.16	1.08	4.39	0.17	1.05
40	0.09	0.56	3.38	0.11	0.58
80	0.05	0.29	2.60	0.07	0.32

The relation of component production expenses to total production expenses may be seen in Figure 5. It will be noted that at very low plant factors the cost of station labor exceeds the cost of fuel. At high plant factors, however, fuel costs become by a substantial margin the largest item of production expenses, amounting at 90 percent plant factor to approximately 80 percent of total expenses, whereas station labor and maintenance constitute only about eight percent and nine percent, respectively. Approximate readings from the curves in Figure 5 and from similar curves for medium size stations and small stations are included in Appendix IV.

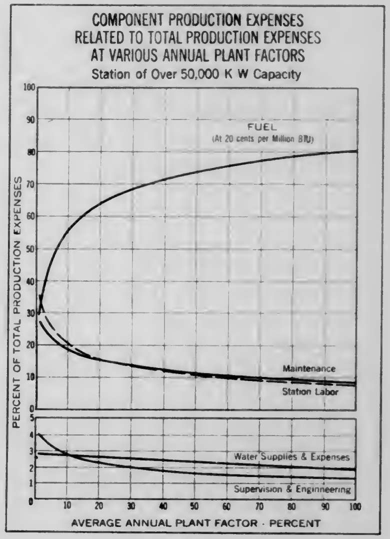

COMPONENT PRODUCTION EXPENSES
RELATED TO TOTAL PRODUCTION EXPENSES
AT VARIOUS ANNUAL PLANT FACTORS
Station of Over 50,000 K W Capacity

Figure 5

The curves shown in Figures 4 and 5 relate entirely to direct operating expenses and do not include taxes, depreciation expenses or return on investment. Maintenance expenses shown include maintenance supervision and engineering, and labor. Water, supplies and expenses consist of the cost of water for boilers and condensers and for cooling purposes, including labor costs associated with water-supply systems; also, the cost of lubricants and miscellaneous station supplies and expenses.

Average incremental production expenses per kilowatt-hour, as determined from the unit cost curves, are set forth in the following tabulation. Comparison of the figures in the table will show that as plant factor increases from 20 percent to 50 percent, and again from 50 percent to 80 percent, unit incremental fuel expenses account for more than 90 percent of total unit incremental expenses. It will be noted, also, that at high plant factors, incremental labor expenses become almost negligible.

PLANT FACTOR PER-CENT	AVERAGE PRODUCTION EXPENSES MILLS PER KWH SMALL	MEDIUM	LARGE	INCREMENTAL PRODUCTION EXPENSES MILLS PER KWH SMALL	MEDIUM	LARGE
			TOTAL PRODUCTION EXPENSES			
20	11.31	8.49	6.85			
50	6.78	5.18	4.19	3.76	2.97	2.42
80	5.31	4.09	3.33	2.86	2.27	1.90
			SUPERVISION AND ENGINEERING			
20	0.33	0.22	0.16			
50	0.15	0.10	0.07	0.03	0.02	0.01
80	0.10	0.07	0.05	0.02	0.02	0.01
			STATION LABOR			
20	2.44	1.46	1.08			
50	1.03	0.62	0.46	0.09	0.06	0.05
80	0.66	0.40	0.29	0.04	0.02	0.01
			FUEL			
20	6.62	5.31	4.39			
50	4.70	3.77	3.10	3.42	2.74	2.24
80	3.93	3.15	2.60	2.65	2.12	1.77
			WATER, SUPPLIES AND EXPENSES			
20	0.43	0.26	0.17			
50	0.23	0.14	0.09	0.10	0.06	0.04
80	0.17	0.10	0.07	0.07	0.04	0.04
			MAINTENANCE			
20	1.49	1.24	1.05			
50	0.67	0.35	0.47	0.12	0.09	0.08
80	0.45	0.37	0.32	0.08	0.07	0.07

The foregoing approximate incremental costs are presented as a matter of interest. It should be emphasized, however, that entirely different stations are included in each average point on the curves; also, while on an annual plant factor basis, the stations may fall within the indicated limits, their monthly plant factors may vary widely. Increments derived from the curves, therefore, must be accepted as only an approximate indication of the performance of individual stations.

PRODUCTION EXPENSES RELATED TO STATION SIZE

Average unit production expenses of steam electric stations decrease consistently as station size increases (Figure 6). However, the rate of decrease becomes gradually less rapid and while medium size stations achieve markedly greater economy than small stations, additional economy attained by stations of much larger capacity is relatively small.

For example, at 60 percent annual plant factor, average total production expenses per kilowatt-hour for 5,000, 25,000, and 100,000 kilowatt stations are respectively 6.4 mills, 4.8 mills and 4.0 mills. Thus between small stations and medium size stations there is a difference of 1.6 mills per kilowatt-hour generated, whereas between medium size stations and large stations the difference is only 0.8 mills.

As station size increases beyond 100,000 kilowatts there is little further decrease in average unit expenses. For 200,000 kilowatt stations, average production expenses total 3.8 mills per kilowatt-hour, only 0.2 mills lower than for 100,000 kilowatt stations. It appears likely that this slight further decrease in expenses, which represents principally a reduction in unit fuel expenses, is due to factors other than additional increase in size of station. Very large stations are located for the most part in metropolitan centers where the additional investment necessary to achieve higher thermal efficiency may be justified by relatively high fuel costs.

Savings in fuel expenses, although not as large proportionately as savings in other production expenses, are principally responsible for the decrease in total unit production expenses as station size increases. This is to be expected of course because of fuel being the predominant item of expense.

Approximate readings from the curves in Figure 6, expressing average unit production expenses at 60 percent average annual plant factor are shown in Appendix V; also shown are the rates of decrease in average unit expenses as station size increases. Relation of component production expenses to total production expenses for stations of various capacities are shown in Appendix VI.

EFFECT OF STATION SIZE ON THERMAL EFFICIENCY

The larger the station and the higher the plant factor, the better the thermal efficiency (Figure 7).

For each successive doubling of the plant factor, thermal efficiency improves, on an average, at a generally constant rate of about 23

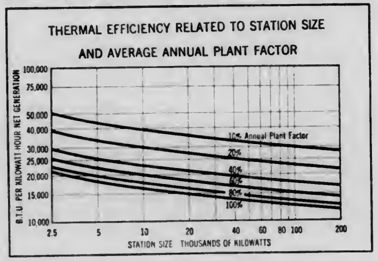


Figure 7

PRODUCTION EXPENSES RELATED TO STATION SIZE AND AVERAGE ANNUAL PLANT FACTOR

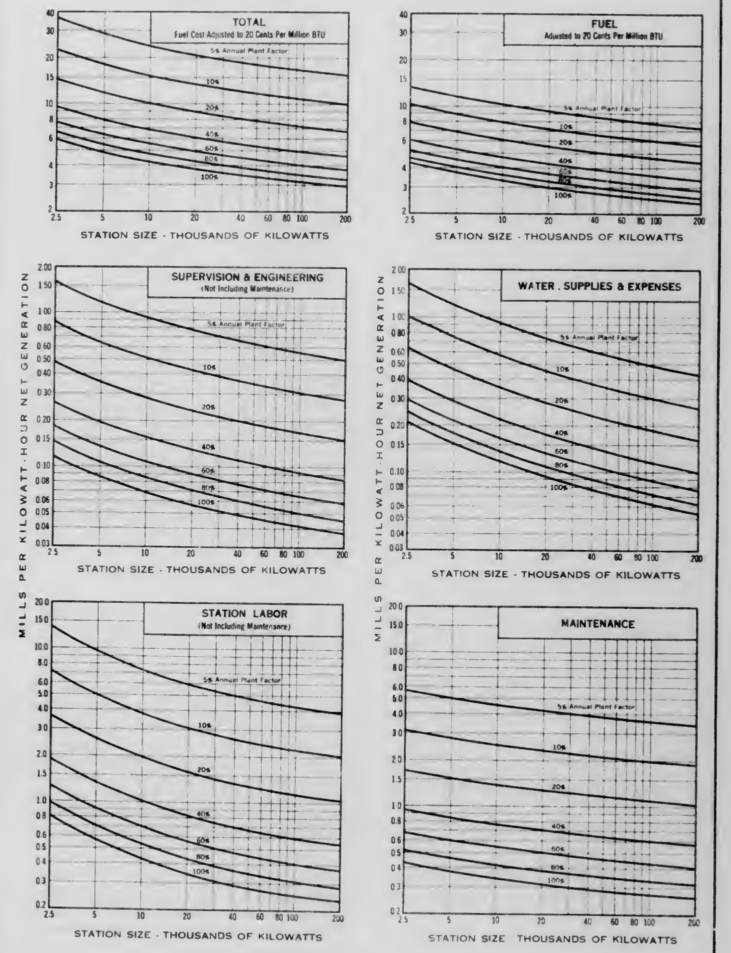


Figure 6

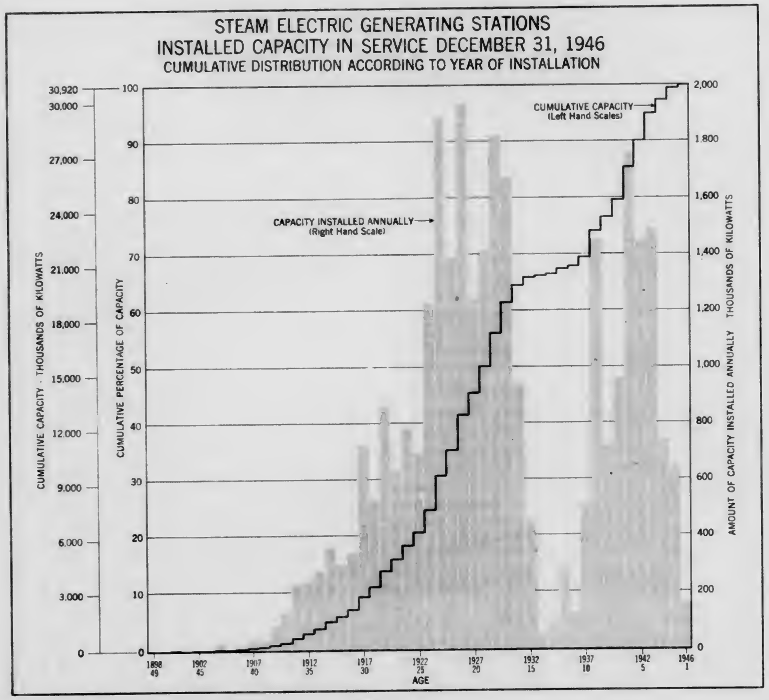


Figure 8

percent. As station size increases, thermal efficiency also increases but at a rate which becomes gradually less rapid. Approximate readings from the curve in Figure 7 expressing average thermal efficiencies at 60 percent average annual plant factor are shown in the following tabulation. Also shown as a matter of interest is average coal consumption per kilowatt-hour based on coal with heat content of 13,000 BTU per pound. Over-all average consumption of coal by all electric utilities for the year 1946 amounted to 1.29 pounds per kilowatt-hour generated.

STATION SIZE 1,000's KW	BTU PER KWH GENERATED AMOUNT	BTU PER KWH GENERATED PERCENT DECREASE	POUNDS OF COAL AND COAL EQUIVALENT PER KWH GENERATED
2.5	25,900		1.99
5	22,550	13	1.73
10	20,050	11	1.54
20	18,250	9	1.40
40	16,800	8	1.29
80	15,450	8	1.19
160	14,500	6	.1.12

PRODUCTION EXPENSES RELATED TO AGE OF STATION

The considerable range in the age of steam electric station capacity in service as of December 31, 1946 may be observed in Figure 8. Referring to the cumulative percentage scale in the figure, it will be noted that approximately 85 percent of this capacity is more than 5 years old, 68 percent is more than 10 years old, 42 percent is more than 20 years old, and seven percent is more than 30 years old.

The continuing technological progress in the design of steam electric stations, throughout the years during which capacities now in service were installed, is reflected in the comparatively high operating efficiencies and resulting low operating costs of stations placed in service in recent years. In Figure 9, average production expenses per kilowatt-hour net generation at an

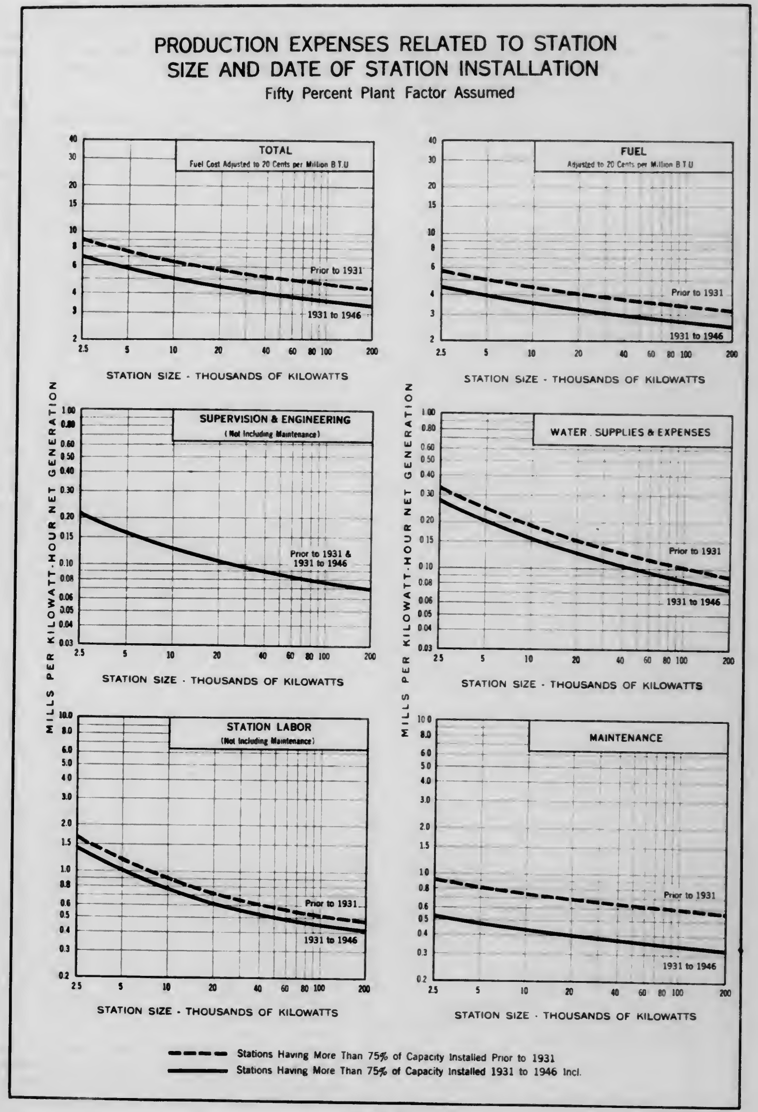


Figure 9

assumed average annual plant factor of 50 percent are shown for two groups of stations; stations having more than 75 percent of capacity installed from 1931 to 1946, inclusive, and stations having more than 75 percent of capacity installed prior to 1931. On an average, total production expenses of stations installed during the earlier period are some 29 percent higher than expenses of stations installed during the later period.

Station labor costs of stations installed prior to 1931 are, on an average, approximately 17 percent higher than labor costs of stations installed from 1931 to 1946. The lower costs of the more recently constructed stations are due in part to the increasing size of generating units as shown in the following tabulation.

PERIOD OF INSTALLATION	NUMBER	GENERATING UNITS TOTAL CAPACITY - KW	 AVERAGE CAPACITY - KW
Prior to 1912	180	591,347	3,285
1912 - 1916	288	1,536,864	5,336
1917 - 1921	399	3,551,811	8,902
1822 - 1926	475	7,148,398	15,049
1927 - 1931	305	7,113,853	23,324
1932 - 1936	39	1,048,852	26,894
1937 - 1941	218	5,426,266	24,891
1942 - 1946	144	4,502,618	31,268
TOTAL	2,048	30,920,009	15,098

Corollary evidence of the effect of increased size of generating units on station labor costs may be observed in Figure 10, in which are shown, for each of the two age groups of stations, average number of employees per station and per kilowatt of capacity for stations of various sizes. Stations installed in the later period require, on the average, approximately one-fourth fewer employees than stations of comparable size installed during the earlier period.

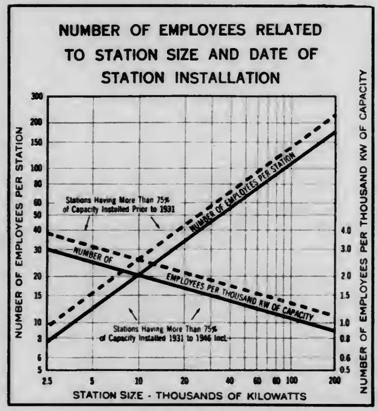


Figure 10

The effect of over-all station size on the average number of employees of steam electric stations also is of interest. Comparison of the following approximate readings from the curves in Figure 10 will show that for each successive doubling of station capacity, the number of employees required per kilowatt of capacity is reduced, on an average, approximately one-sixth.

STATION SIZE 1,000'S KW	NO. OF EMPLOYEES PER STATION STATIONS CONSTRUCTED PRIOR TO 1931	 STATIONS CONSTRUCTED 1931 TO 1946	NO. OF EMPLOYEES PER 1,000 KW STATIONS CONSTRUCTED PRIOR TO 1931	 STATIONS CONSTRUCTED 1931 TO 1946
2.5	10	8	4.0	3.2
5	16	12	3.2	2.4
10	26	21	2.6	2.1
20	43	34	2.2	1.7
40	71	56	1.8	1.4
80	117	92	1.5	1.2
160	194	152	1.2	1.0

Average fuel costs of stations installed prior to 1931 are approximately 27 percent higher than for stations installed from 1931 to 1946 (Figure 9). The lower fuel costs of the later stations reflect the considerable increase in the thermal efficiency of steam electric stations that has been achieved since the early 1900's (Figure 11).

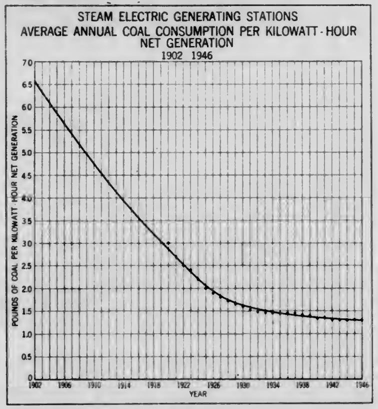


Figure 11

Due to the considerably higher cost of maintaining in service older equipment, maintenance expenses of stations installed prior to 1931 are, on an average, approximately 74 percent higher than maintenance expenses of stations installed from 1931 to 1946. Water, supplies and expenses for the older stations are approximately 22 percent higher than for the newer stations, and supervision and engineering expenses are, on an average, about the same for both groups of stations.

Further evidence of the effect of age of station on average operating costs is disclosed by examination of the production expenses of stations having more than 75 percent of capacity installed prior to 1924. Average total unit production expenses of these stations are approximately 35 percent higher than average unit expenses of stations installed from 1931 to 1946. On an average, station labor costs of the older stations are approximately 26 percent higher; fuel costs are 32 percent higher; water, supplies and expenses are 22 percent higher; and maintenance expenses are 83 percent higher. Supervision and engineering expenses are approximately the same for both groups of stations.

Approximate readings from the curves in Figure 9 for stations of 80,000 kilowatts capacity are shown in the following tabulation. Also shown are average unit production expenses of stations installed prior to 1924.

PRODUCTION EXPENSE	AVERAGE PRODUCTION EXPENSES PER KWH - MILLS 50 PERCENT PLANT FACTOR ASSUMED STATIONS INSTALLED 1931 TO 1946	 STATIONS INSTALLED PRIOR TO 1931	 STATIONS INSTALLED PRIOR TO 1924
Total	3.72	4.81	5.02
Supervision and Engineering	0.08	0.08	0.08
Station Labor	0.46	0.54	0.58
Fuel	2.74	3.47	3.61
Water, Supplies and Expenses	0.09	0.11	0.11
Maintenance	0.35	0.61	0.64

Figure 8 is based on data contained in Appendix VII.

Figure 9 is based on the classification, according to the periods indicated, of data contained in Appendix III. However, because in many instances the total capacity of a station represents the sum of the capacities of individual generating units installed over a considerable number of years, and in order that the relation of production expenses to date of installation might be indicated as clearly as possible, the stations represented in Figure 9 are limited to those having more than 75 percent of capacity installed within the period specified. Data for individual stations were adjusted to a common plant factor of 50 percent by increasing or decreasing the expenses of each station a percentage amount indicated by the curves in Figure 6 to be the average percentage difference between expenses at 50 percent plant factor and the plant factor of the individual station. The number and total capacity of the stations represented in each group are shown in Appendix VIII.

Data used in preparation of Figure 10 are contained in Appendix VIII.

Data shown in Figure 11 for the years 1920 to 1946, inclusive, are contained in Appendix IX. For previous years, the data are taken from Figure 9, page xx, of the Commission's National Power Survey Interim Report, Power Series No. 1, published in 1935.

APPENDIX I

STEAM ELECTRIC GENERATING STATION INVESTMENT

INTERVAL STATION SIZE 1,000's KW	NUMBER OF STATIONS	CAPACITY KW	LAND	STRUCTURES	EQUIPMENT	TOTAL
TOTAL CAPACITY AND TOTAL INVESTMENT						
0.00- 1.00	11	6,768	$ 27,811	$ 223,668	$ 929,779	$ 1,181,258
1.01- 2.00	6	9,750	27,295	283,475	1,124,046	1,434,816
2.01- 5.00	23	77,070	176,716	1,693,969	7,468,489	9,339,174
5.01- 10.00	37	282,760	1,096,129	6,553,753	23,596,872	31,246,754
10.01- 25.00	48	802,193	1,603,063	20,812,758	63,232,159	85,647,980
25.01- 50.00	43	1,699,271	2,604,649	41,880,242	127,445,209	171,930,100
50.01-100.00	38	2,736,846	6,375,837	59,579,877	192,265,686	258,221,400
100.01-200.00	35	5,231,350	8,210,156	128,407,851	347,476,151	484,094,158
over 200.00	29	9,595,250	12,818,522	236,441,241	668,314,773	917,574,536
TOTAL	**270**	**20,441,258**	**$32,940,178**	**$495,876,894**	**$1,431,853,164**	**$1,960,670,176**
AVERAGE STATION SIZE AND AVERAGE INVESTMENT PER STATION						
0.00- 1.00	11	615	$ 2,528	$ 20,333	$ 84,526	$ 107,387
1.01- 2.00	6	1,625	4,549	47,246	187,341	239,136
2.01- 5.00	23	3,351	7,683	73,651	324,717	406,051
5.01- 10.00	37	7,642	29,625	177,128	637,754	844,507
10.01- 25.00	48	16,712	33,397	433,599	1,317,337	1,784,333
25.01- 50.00	43	39,518	60,573	973,959	2,963,842	3,998,374
50.01-100.00	38	72,022	167,785	1,567,892	5,059,623	6,795,300
100.01-200.00	35	149,467	234,576	3,668,796	9,927,890	13,831,262
over 200.00	29	330,871	442,018	8,153,146	23,045,337	31,640,501
TOTAL	**270**	**75,708**	**$ 122,001**	**$ 1,836,581**	**$ 5,303,159**	**$ 7,261,741**
AVERAGE STATION SIZE AND AVERAGE INVESTMENT PER KILOWATT						
0.00- 1.00	11	615	$ 4	$ 33	$ 138	$ 175
1.01- 2.00	6	1,625	3	29	115	147
2.01- 5.00	23	3,351	2	22	97	121
5.01- 10.00	37	7,642	4	23	84	111
10.01- 25.00	48	16,712	2	26	79	107
25.01- 50.00	43	39,518	2	25	74	101
50.01-100.00	38	72,022	2	22	70	94
100.01-200.00	35	149,467	2	25	66	93
over 200.00	29	330,871	1	25	70	96
TOTAL	**270**	**75,708**	**$ 2**	**$ 24**	**$ 70**	**$ 96**

APPENDIX II

STEAM ELECTRIC GENERATING STATION INVESTMENT

(STATIONS OF OVER 25,000 KW CAPACITY)
FREQUENCY DISTRIBUTION ACCORDING TO TOTAL COST PER KILOWATT OF CAPACITY

INTERVAL DOLLAR PER KILOWATT	NUMBER OF STATIONS	TOTAL COST		CAPACITY		
		AMOUNT	PER KILOWATT	KW	PERCENT OF TOTAL	CUMULATIVE PERCENT
STATIONS HAVING MORE THAN 75% OF CAPACITY INSTALLED 1911 TO 1930 INCLUSIVE						
61 - 70	5	$ 32,516,676	$ 66	492,640	8.4	8.4
71 - 80	7	26,014,034	76	341,500	5.8	14.2
81 - 90	12	110,949,988	85	1,304,750	22.3	36.5
91 - 100	7	84,529,460	94	894,750	15.3	51.8
101 - 110	11	171,341,554	105	1,629,000	27.8	79.6
111 - 120	4	102,291,205	114	900,000	15.3	94.9
121 - 130	1	24,026,663	129	186,750	3.2	98.1
131 - 140	3	15,305,384	137	111,500	1.9	100.0
TOTAL	**50**	**$566,974,964**	**$ 97**	**5,860,890**	**100.0**	
STATIONS HAVING MORE THAN 75% OF CAPACITY INSTALLED 1931 TO 1946 INCLUSIVE						
61 - 70	3	$ 16,751,205	$ 66	255,000	8.8	8.8
71 - 80	5	69,030,325	76	902,500	31.0	39.8
81 - 90	7	90,686,406	84	1,077,000	37.1	76.9
91 - 100	1	3,363,853	96	35,000	1.2	78.1
101 - 110	5	29,415,772	104	283,000	9.7	87.8
111 - 120	4	35,507,747	116	305,500	10.5	98.3
121 - 130	1	6,094,449	122	50,000	1.7	100.0
TOTAL	**26**	**$250,849,757**	**$ 86**	**2,908,000**	**100.0**	

APPENDIX III

STEAM ELECTRIC GENERATING STATION PRODUCTION EXPENSES

INTERVAL ANNUAL PLANT FACTOR - PERCENT	NO. OF STATIONS	CAPACITY - KW		NET GENERATION 1.000's KWH	WEIGHTED AVERAGE ANNUAL PLANT FACTOR - PERCENT	PRODUCTION EXPENSES											
						SUPERVISION AND ENGINEERING[1]		STATION LABOR[1]		FUEL[2]		WATER, SUPPLIES AND EXPENSES		MAINTENANCE		TOTAL	
		TOTAL	AVERAGE PER STATION			AMOUNT	PER KWH MILLS	AMOUNT	PER KWH MILLS	AMOUNT	PER KWH MILLS	AMOUNT	PER KWH MILLS	AMOUNT	PER KWH MILLS	AMOUNT	PER KWH MILLS
SMALL STATIONS - 10,000 KW AND UNDER																	
1.1 - 5.0	16	65.235	4,077	15.402	2.7	$ 33.977	2.21	$ 219.689	14.26	$ 181,538	11.79	$ 27.633	1.79	$ 193.285	12.55	$ 656.122	42.60
5.1 - 10.0	15	85,595	5,706	59,845	8.0	46,490	0.78	344.838	5.76	575,440	9.62	44,355	0.74	173,079	2.89	1.184.202	19.79
10.1 - 20.0	16	105.600	6.600	127,403	13.8	37.270	0.29	358.220	2.81	998,228	7.84	59,961	0.47	241,715	1.90	1,695,394	13.31
20.1 - 30.0	9	72.610	8,068	158,873	25.0	31.905	0.20	232,924	1.47	906.052	5.70	51.633	0.32	162,849	1.03	1,385,363	8.72
30.1 - 40.0	24	139,550	5.815	429.319	35.1	90.709	0.21	674.857	1.57	2.308.534	5.38	142.440	0.33	408,712	0.95	3,625,252	8.44
40.1 - 50.0	11	67,000	6,091	272,786	46.5	54.746	0.20	356.946	1.31	1.303.756	4.78	76.160	0.28	159.545	0.58	1,951,153	7.15
50.1 - 60.0	8	43.300	5.413	202.491	53.4	28.216	0.14	247.277	1.22	1.043.652	5.15	54,552	0.27	177,667	0.88	1,551,364	7.66
60.1 - 70.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70.1 - 80.0	5	38.000	7.600	251.640	75.6	25,822	0.10	169,787	0.67	1.136.632	4.53	47.748	0.19	114.131	0.45	1.494.120	5.94
80.1 - 90.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Over 90.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	104	616.890	5,932	1.517.759	28.1	$ 349.135	0.23	$ 2.604.538	1.72	$ 8.453.832	5.57	$ 504,482	0.33	$ 1.630.983	1.07	$ 13,542,970	8.92
MEDIUM STATIONS - 10,001 KW TO 50,000 KW																	
1.1 - 5.0	7	188,780	26.969	69,183	4.2	$ 59,714	0.87	$ 375,114	5.42	$ 756,420	10.93	$ 44,325	0.64	$ 276.835	4.00	$ 1.512.408	21.86
5.1 - 10.0	6	132.250	22,042	90,153	7.8	51.029	0.57	358.410	3.98	699.886	7.75	49.306	0.55	234,854	2.61	1.393.485	15.46
10.1 - 20.0	23	607.862	26,429	819,518	15.4	200,132	0.24	1.722.069	2.10	4,896,634	5.98	246,443	0.30	1.310,870	1.60	8,376,148	10.22
20.1 - 30.0	14	377.985	26.999	867.889	26.2	191,973	0.22	965.705	1.11	4.012.582	4.63	164.306	0.19	877.964	1.01	6.212.530	7.16
30.1 - 40.0	23	634,100	27.570	1,946.653	35.0	322.466	0.17	1,980.265	1.02	8.515.296	4.37	345.989	0.18	1,560,772	0.80	12,724.788	6.54
40.1 - 50.0	17	395.562	23,268	1.552.478	44.8	181,719	0.12	1.182,441	0.76	6.413,228	4.12	241.798	0.16	1.250,879	0.81	9,270.065	5.97
50.1 - 60.0	19	593.000	31.211	2,907.265	56.0	264.362	0.09	1,543.243	0.53	10,815,310	3.73	446.667	0.15	1,569,121	0.54	14,638,703	5.04
60.1 - 70.0	13	375.000	28.846	2.164.224	65.9	201,051	0.09	987.628	0.46	6,930.272	3.20	190.510	0.09	909.109	0.42	9.218,570	4.26
70.1 - 80.0	7	206,000	29,429	1,355.590	75.1	137,119	0.10	548.810	0.40	4.584.740	3.38	149.681	0.11	536.319	0.40	5,956,669	4.39
80.1 - 90.0	12	380,000	31.667	2.778,880	83.5	236.413	0.09	1.011.995	0.36	8.429.260	3.04	200.935	0.07	839,315	0.30	10.717.918	3.86
Over 90.0	10	299.750	29.975	2,586,279	98.5	126.948	0.05	623.334	0.24	7,669.484	2.96	110.917	0.04	610.166	0.24	9.140,849	3.53
TOTAL	151	4,190,289	27,750	17.138,112	46.7	$1,972,926	0.12	$11.299.014	0.66	$63.723.112	3.71	$2,190.877	0.13	$ 9.976.204	0.58	$ 89.162.133	5.20
LARGE STATIONS - OVER 50,000 KW																	
1.1 - 5.0	1	60,000	60.000	12,316	2.3	$ 599	0.05	$ 88,928	7.22	$ 121,892	9.90	$ 9,650	0.78	$ 57.665	4.68	$ 278.734	22.63
5.1 - 10.0	2	168,000	84,000	106.367	7.2	25.406	0.24	286,412	2.69	807.390	7.59	60,727	0.57	320,027	3.01	1,499.962	14.10
10.1 - 20.0	7	496.560	70,937	657.933	15.1	132.417	0.20	908.733	1.38	3.274.374	4.98	157.302	0.24	948,496	1.44	5.421,322	8.24
20.1 - 30.0	7	858.500	122,643	2.119.782	28.2	226,045	0.11	1.907,088	0.90	8.505.310	4.01	268,509	0.13	1,809,203	0.85	12,716.155	6.00
30.1 - 40.0	17	3.063.546	180,209	9.880.739	36.8	834.820	0.08	6.619,246	0.67	34.058,044	3.45	1,037,359	0.11	9,849,954	1.00	52,399,423	5.31
40.1 - 50.0	30	5.787.000	192.900	23,066.774	45.5	1.607,530	0.07	12,798,075	0.56	71.457,304	3.10	2.324.001	0.10	15.274,309	0.66	103.461.219	4.49
50.1 - 60.0	34	5.614.540	165.134	26,748.919	54.4	1.741.350	0.07	11.776.236	0.44	76,501.038	2.86	2.241.251	0.08	12.530,543	0.47	104.790.418	3.92
60.1 - 70.0	23	3.590.400	156,104	20,062.039	63.8	1.074.277	0.05	6.629.276	0.33	55.307.996	2.76	1.047.276	0.05	8.223,207	0.41	72.282,032	3.60
70.1 - 80.0	14	1,767.500	126.250	11,444.323	73.9	640.296	0.06	3.171.329	0.28	31.791.642	2.77	955.628	0.08	3,845.573	0.34	40.404,468	3.53
80.1 - 90.0	3	535,000	178.333	3.949,184	84.3	124,479	0.03	1,010,867	0.25	10.019.560	2.54	153.780	0.04	1.093.524	0.28	12.402.210	3.14
Over 90.0	3	261.200	87,067	2.264.192	99.0	149.837	0.07	544.535	0.24	6,449.502	2.84	216,654	0.10	608.422	0.27	7.968.950	3.52
TOTAL	141	22,202,246	157,463	100,312,568	51.6	$6.557.066	0.07	$45.740.726	0.46	$298.294.062	2.97	$8.472.137	0.08	$54.560.925	0.54	$413.624.893	4.12

(1) Not including maintenance. (2) Fuel cost adjusted to 20 cents per million BTU.

APPENDIX IV

COMPONENT PRODUCTION EXPENSES RELATED TO TOTAL PRODUCTION EXPENSES AT VARIOUS AVERAGE ANNUAL PLANT FACTORS

(Approximate Readings From Curves Based on Data Shown in Table C)

AVERAGE ANNUAL PLANT FACTOR PERCENT	SUPERVISION AND ENGINEERING[1]		STATION LABOR[1]		FUEL[2]		WATER, SUPPLIES AND EXPENSES		MAINTENANCE		TOTAL
	PER KWH MILLS	PERCENT OF TOTAL	PER KWH MILLS	PERCENT OF TOTAL	PER KWH MILLS	PERCENT OF TOTAL	PER KWH MILLS	PERCENT OF TOTAL	PER KWH MILLS	PERCENT OF TOTAL	
SMALL STATIONS - 10,000 KW AND UNDER											
1.25	3.64	*4.8*	33.37	*44.5*	18.84	*25.1*	2.94	*3.9*	16.29	*21.7*	75.08
2.50	2.00	*4.5*	17.35	*38.9*	14.51	*32.4*	1.82	*4.1*	8.96	*20.1*	44.64
5	1.10	*4.0*	9.02	*33.0*	11.17	*40.9*	1.13	*4.1*	4.93	*18.0*	27.35
10	0.61	*3.5*	4.69	*27.1*	8.60	*49.7*	0.70	*4.0*	2.71	*15.7*	17.31
20	0.33	*2.9*	2.44	*21.6*	6.62	*58.5*	0.43	*3.8*	1.49	*13.2*	11.31
40	0.18	*2.4*	1.27	*16.6*	5.10	*66.8*	0.27	*3.5*	0.82	*10.7*	7.64
60	0.13	*2.1*	0.87	*14.1*	4.39	*71.2*	0.20	*3.2*	0.58	*9.4*	6.17
80	0.10	*1.9*	0.66	*12.4*	3.93	*74.1*	0.17	*3.1*	0.45	*8.5*	5.31
100	0.08	*1.7*	0.53	*11.2*	3.62	*76.3*	0.14	*3.0*	0.37	*7.8*	4.74
MEDIUM STATIONS - 10,001 KW TO 50,000 KW											
1.25	2.38	*4.5*	19.96	*37.8*	15.12	*28.7*	1.75	*3.3*	13.53	*25.7*	52.74
2.50	1.31	*4.1*	10.38	*32.6*	11.64	*36.5*	1.08	*3.4*	7.44	*23.4*	31.85
5	0.72	*3.6*	5.40	*27.2*	8.96	*45.2*	0.67	*3.4*	4.09	*20.6*	19.84
10	0.40	*3.1*	2.81	*22.0*	6.90	*54.0*	0.42	*3.3*	2.25	*17.6*	12.78
20	0.22	*2.6*	1.46	*17.2*	5.31	*62.6*	0.26	*3.0*	1.24	*14.6*	8.49
40	0.12	*2.1*	0.76	*13.1*	4.09	*70.3*	0.16	*2.8*	0.68	*11.7*	5.81
60	0.08	*1.7*	0.52	*11.0*	3.52	*74.6*	0.12	*2.5*	0.48	*10.2*	4.72
80	0.07	*1.7*	0.40	*9.8*	3.15	*77.1*	0.10	*2.4*	0.37	*9.0*	4.09
100	0.05	*1.4*	0.32	*8.7*	2.90	*79.2*	0.09	*2.5*	0.30	*8.2*	3.66
LARGE STATIONS - OVER 50,000 KW											
1.25	1.71	*4.1*	14.79	*35.5*	12.48	*30.0*	1.15	*2.8*	11.47	*27.6*	41.60
2.50	0.94	*3.7*	7.69	*30.4*	9.61	*38.1*	0.71	*2.8*	6.31	*25.0*	25.26
5	0.52	*3.3*	4.00	*25.3*	7.40	*46.7*	0.44	*2.8*	3.47	*21.9*	15.83
10	0.28	*2.7*	2.08	*20.3*	5.70	*55.8*	0.27	*2.6*	1.91	*18.6*	10.24
20	0.16	*2.3*	1.08	*15.8*	4.39	*64.1*	0.17	*2.5*	1.05	*15.3*	6.85
40	0.09	*1.9*	0.56	*11.9*	3.38	*71.6*	0.11	*2.3*	0.58	*12.3*	4.72
60	0.06	*1.6*	0.38	*9.9*	2.90	*75.7*	0.08	*2.1*	0.41	*10.7*	3.83
80	0.05	*1.5*	0.29	*8.7*	2.60	*78.3*	0.07	*1.9*	0.32	*9.6*	3.33
100	0.04	*1.3*	0.23	*7.7*	2.40	*80.3*	0.06	*2.0*	0.26	*8.7*	2.99

[1] Not including maintenance.

[2] Fuel cost adjusted to 20 cents per million BTU.

APPENDIX V

PRODUCTION EXPENSES RELATED TO STATION SIZE

PERCENT DECREASE IN AVERAGE PRODUCTION EXPENSES PER KILOWATT-HOUR AS STATION SIZE INCREASES

(Approximate Readings From 60 Percent Annual Plant Factor Curve In Figure 6)

STATION SIZE 1,000's KW	SUPERVISION AND ENGINEERING[1]		STATION LABOR[1]		FUEL[2]		WATER, SUPPLIES AND EXPENSES		MAINTENANCE		TOTAL	
	PER KWH MILLS	PERCENT DECREASE[3]	PER KWH MILLS	PERCENT DECREASE	PER KWH MILLS	PERCENT DECREASE	PER KWH MILLS	PERCENT DECREASE[3]	PER KWH MILLS	PERCENT DECREASE	PER KWH MILLS	PERCENT DECREASE
2.5	0.18		1.28		5.18		0.30		0.67		7.61	
5	0.14	26	0.91	29	4.51	13	0.22	27	0.60	11	6.38	16
10	0.11	21	0.69	24	4.01	11	0.17	23	0.55	8	5.53	13
20	0.09	16	0.55	20	3.65	9	0.13	20	0.51	8	4.93	11
40	0.08	14	0.47	15	3.36	8	0.11	17	0.47	7	4.49	9
80	0.07	13	0.42	11	3.09	8	0.09	16	0.44	6	4.11	8
160	0.06	11	0.38	10	2.90	6	0.08	14	0.41	6	3.83	7

[1] Not including maintenance

[2] Fuel cost adjusted to 20 cents per million BTU.

[3] Percentage figures based on unit costs stated to three decimal places.

APPENDIX VI

RELATION OF COMPONENT PRODUCTION EXPENSES TO TOTAL PRODUCTION EXPENSES

FOR STATIONS OF VARIOUS CAPACITIES

(Approximate Readings From 60 Percent Annual Plant Factor Curve in Figure 6)

STATION SIZE 1,000's KW	SUPERVISION AND ENGINEERING[1]		STATION LABOR[1]		FUEL[2]		WATER, SUPPLIES AND EXPENSES		MAINTENANCE		TOTAL
	PER KWH MILLS	PERCENT OF TOTAL[3]	PER KWH MILLS	PERCENT OF TOTAL	PER KWH MILLS	PERCENT OF TOTAL	PER KWH MILLS	PERCENT OF TOTAL	PER KWH MILLS	PERCENT OF TOTAL	
2.5	0.18	2	1.28	17	5.18	68	0.30	4	0.67	9	7.61
5	0.14	2	0.91	14	4.51	72	0.22	3	0.60	9	6.38
10	0.11	2	0.69	12	4.01	73	0.17	3	0.51	10	5.53
20	0.09	2	0.55	11	3.65	74	0.13	3	0.51	10	4.93
40	0.08	2	0.47	10	3.36	75	0.11	2	0.47	11	4.49
80	0.07	2	0.42	10	3.09	75	0.09	2	0.44	11	4.11
160	0.06	1	0.38	10	2.90	76	0.08	2	0.41	11	3.83

[1] Not including maintenance.

[2] Fuel cost adjusted to 20 cents per million BTU.

[3] Percentage figures based on unit costs stated to three decimal places.

APPENDIX VII

STEAM ELECTRIC GENERATING STATIONS

INSTALLED CAPACITY IN SERVICE DECEMBER 31, 1946

CUMULATIVE DISTRIBUTION ACCORDING TO YEAR OF INSTALLATION

YEAR INSTALLED	NUMBER OF GENERATORS	CAPACITY			YEAR INSTALLED	NUMBER OF GENERATORS	CAPACITY		
		KW	PERCENT OF TOTAL	CUMULATIVE PERCENT			KW	PERCENT OF TOTAL	CUMULATIVE PERCENT
1898	3	1,200	0.0		1923	103	1,229.050	4.0	24.6
1899	1	160	0.0	0.0	1924	118	1,890,885	6.1	30.7
1900	2	400	0.0	0.0	1925	83	1,398,450	4.5	35.2
1902	3	2,620	0.0	0.0	1926	94	1,933,810	6.4	41.6
1903	3	1,450	0.0	0.0	1927	73	1,249,625	4.0	45.6
1904	9	29,800	0.1	0.1	1928	68	1,420,300	4.6	50.2
1905	10	7,968	0.0	0.1	1929	66	1,824,378	5.9	56.1
1906	11	14,910	0.1	0.2	1930	67	1,674,050	5.4	61.5
1907	15	33,780	0.1	0.3	1931	31	945,500	3.1	64.6
1908	12	38,370	0.1	0.4	1932	9	469,000	1.5	66.1
1909	23	88,850	0.3	0.7	1933	3	56,252	0.2	66.3
1910	45	134,125	0.4	1.1	1934	4	97,500	0.3	66.6
1911	43	237,714	0.8	1.9	1935	6	294,250	1.0	67.6
1912	57	244,395	0.8	2.7	1936	17	131,850	0.4	68.0
1913	52	281,595	0.9	3.6	1937	40	520,938	1.7	69.7
1914	55	362,355	1.2	4.8	1938	55	1,453,206	4.7	74.4
1915	52	304,594	1.0	5.8	1939	27	723,500	2.3	76.7
1916	72	343,925	1.1	6.9	1940	41	966,650	3.1	79.8
1917	104	724,365	2.3	9.2	1941	55	1,761,972	5.7	85.5
1918	57	538,565	1.7	10.9	1942	50	1,450,915	4.7	90.2
1919	80	865,796	2.8	13.7	1943	39	1,498,550	4.8	95.0
1920	68	639,273	2.1	15.8	1944	21	742,950	2.4	97.4
1921	90	783,812	2.5	18.3	1945	21	642,220	2.1	99.5
1922	77	696,703	2.3	20.6	1946	13	167,983	0.5	100.0
TOTAL						2,048	30,920,009	100.0	

APPENDIX VIII

NUMBER OF EMPLOYEES RELATED TO STATION SIZE AND DATE OF STATION INSTALLATION

PERIOD	NUMBER OF STATIONS*	CAPACITY - KW		NUMBER OF EMPLOYEES		
		TOTAL	PER STATION	TOTAL	PER STATION	PER THOUSAND KW OF CAPACITY
SMALL STATIONS - 10,000 KW AND UNDER						
Prior to 1931	65	380,980	5,861	1,074	17	2.8
1931 to 1946	11	77,250	7,023	162	15	2.1
Total	**76**	**458,230**	**6,029**	**1,236**	**16**	**2.7**
MEDIUM STATIONS - 10,001 KW TO 50,000 KW						
Prior to 1931	76	2,007,217	26,411	3,960	52	2.0
1931 to 1946	26	781,900	30,073	1,201	46	1.5
Total	**102**	**2,789,117**	**27,344**	**5,161**	**51**	**1.9**
LARGE STATIONS - OVER 50,000 KW						
Prior to 1931	44	6,633,290	150,757	8,073	183	1.2
1931 to 1946	18	2,458,250	136,569	2,416	134	1.0
Total	**62**	**9,091,540**	**146,638**	**10,489**	**169**	**1.2**

*Stations having more than 75 percent of capacity installed during period indicated.

APPENDIX IX

STEAM ELECTRIC GENERATING STATIONS*

AVERAGE ANNUAL COAL CONSUMPTION PER KILOWATT-HOUR NET GENERATION

1920 - 1946

YEAR	COAL CONSUMED (MILLIONS OF SHORT TONS)	KILOWATT-HOURS PRODUCED BY COAL (BILLIONS)	ANNUAL COAL RATE (LBS. PER KWH)	YEAR	COAL CONSUMED (MILLIONS OF SHORT TONS)	KILOWATT-HOURS PRODUCED BY COAL (BILLIONS)	ANNUAL COAL RATE (LBS. PER KWH)
1946	72.2	111.7	1.29	1932	28.1	37.7	1.49
1945	74.7	114.8	1.30	1931	36.1	47.7	1.52
1944	80.1	124.1	1.29	1930	40.3	50.5	1.60
1943	77.3	119.2	1.30	1929	41.8	50.4	1.66
1942	66.3	101.9	1.30	1928	38.0	43.9	1.73
1941	62.7	93.8	1.34	1927	38.2	41.9	1.82
1940	51.5	76.8	1.34	1926	36.8	38.8	1.90
1939	44.5	64.7	1.38	1925	35.6	35.1	2.0
1938	38.4	54.7	1.40	1924	32.8	29.5	2.2
1937	42.9	59.7	1.44	1923	33.6	28.1	2.4
1936	40.1	55.8	1.44	1922	29.2	23.2	2.5
1935	32.7	45.4	1.44	1921	26.6	19.5	2.7
1934	31.4	43.4	1.45	1920	31.6	20.8	3.0
1933	28.5	39.0	1.46				

*All electric utilities in the United States.

APPENDIX VIII

NUMBER OF EMPLOYEES RELATED TO STATION SIZE AND DATE OF STATION INSTALLATION

PERIOD	NUMBER OF STATIONS*	CAPACITY - KW		NUMBER OF EMPLOYEES		
		TOTAL	PER STATION	TOTAL	PER STATION	PER THOUSAND KW OF CAPACITY
SMALL STATIONS - 10,000 KW AND UNDER						
Prior to 1931	65	380,980	5,861	1,074	17	2.8
1931 to 1946	11	77,250	7,023	162	15	2.1
Total	**76**	**458,230**	**6,029**	**1,236**	**16**	**2.7**
MEDIUM STATIONS - 10,001 KW TO 50,000 KW						
Prior to 1931	76	2,007,217	26,411	3,960	52	2.0
1931 to 1946	26	781,900	30,073	1,201	46	1.5
Total	**102**	**2,789,117**	**27,344**	**5,161**	**51**	**1.9**
LARGE STATIONS - OVER 50,000 KW						
Prior to 1931	44	6,633,290	150,757	8,073	183	1.2
1931 to 1946	18	2,458,250	136,569	2,416	134	1.0
Total	**62**	**9,091,540**	**146,638**	**10,489**	**169**	**1.2**

---

*Stations having more than 75 percent of capacity installed during period indicated.

APPENDIX IX

STEAM ELECTRIC GENERATING STATIONS*

AVERAGE ANNUAL COAL CONSUMPTION PER KILOWATT-HOUR NET GENERATION

1920 - 1946

YEAR	COAL CONSUMED (MILLIONS OF SHORT TONS)	KILOWATT-HOURS PRODUCED BY COAL (BILLIONS)	ANNUAL COAL RATE (LBS. PER KWH)	YEAR	COAL CONSUMED (MILLIONS OF SHORT TONS)	KILOWATT-HOURS PRODUCED BY COAL (BILLIONS)	ANNUAL COAL RATE (LBS. PER KWH)
1946	72.2	111.7	1.29	1932	28.1	37.7	1.49
1945	74.7	114.8	1.30	1931	36.1	47.7	1.52
1944	80.1	124.1	1.29	1930	40.3	50.5	1.60
1943	77.3	119.2	1.30	1929	41.8	50.4	1.66
1942	66.3	101.9	1.30	1928	38.0	43.9	1.73
1941	62.7	93.8	1.34	1927	38.2	41.9	1.82
1940	51.5	76.8	1.34	1926	36.8	38.8	1.90
1939	44.5	64.7	1.38	1925	35.6	35.1	2.0
1938	38.4	54.7	1.40	1924	32.8	29.5	2.2
1937	42.9	59.7	1.44	1923	33.6	28.1	2.4
1936	40.1	55.8	1.44	1922	29.2	23.2	2,5
1935	32.7	45.4	1.44	1921	26.6	19.5	2.7
1934	31.4	43.4	1.45	1920	31.6	20.8	3.0
1933	28.5	39.0	1.46				

---

*All electric utilities in the United States.

FEDERAL POWER COMMISSION - PUBLICATIONS

RATE SERIES

NATIONAL ELECTRIC RATE BOOK - - The National Electric Rate Book and individual Rate Books for the 48 States, covering the rates charged by publicly and privately owned utilities in communities of 1,000 or more population, are issued in loose leaf binders. Supplements showing rate changes and new rate schedules are issued to replace superseded data. Price $10, including binders and Supplement Service for 12 months from date of order; Supplement Service thereafter, $7.50 per year. State Rate Books, $1.00 each.

TYPICAL ELECTRIC BILLS, CITIES OF 50,000 POPULATION AND MORE - - Includes bills for residential, commercial and industrial service. Issued annually - 25 cents.

TYPICAL RESIDENTIAL ELECTRIC BILLS, CITIES OF 2,500 POPULATION AND MORE - - Arranged by States. Issued annually - 25 cents.

POWER SERIES

ELECTRIC POWER STATISTICS - - Monthly and annual reports on the production of electric energy and capacity of generating plants; consumption of fuel for production of electric energy; monthly reports on stocks of fuel for the production of electric energy; electric utility system peak loads; sales, revenues and income of privately owned electric utilities; and occasional Supplements on subjects related to the electric power industry. Subscription - $2.00 per year.

PRODUCTION OF ELECTRIC ENERGY AND CAPACITY OF GENERATING PLANTS - - Yearly report giving annual totals and detailed information by States on electric utility generation and capacity, both by type of prime mover and by class of ownership, Issued annually - 25 cents.

CONSUMPTION OF FUEL FOR PRODUCTION OF ELECTRIC ENERGY - - Yearly report showing annual totals and detailed figures on coal, oil, and gas consumed by electric utility power plants with kilowatt-hours generated and fuel rates, including information separately by States. Issued annually - 10 cents.

INDUSTRIAL ELECTRIC POWER IN THE UNITED STATES, 1939 - 1946 - - Presents data for total utility and non-utility generation of electric energy, total industrial use and use by major industry groups for each year from 1939 through 1946. 50 cents.

FINANCIAL SERIES

STATISTICS OF ELECTRIC UTILITIES - - Contains for each Class A and Class B privately owned electric utility statements of the balance sheet, income and earned surplus accounts, operating revenues, customers and sales, and operating expenses, together with details respecting capital stock, long term debt, plant investment, and physical plant. Issued annually - $2.00.

STATISTICS OF PUBLICLY OWNED ELECTRIC UTILITIES - - Condensed financial and operating statements of 159 of the larger publicly owned electric utilities and selected financial and operating data on 652 smaller utilities. Issued annually - $1.00.

THE FINANCIAL RECORD OF THE ELECTRIC UTILITY INDUSTRY - - Contains composite financial statements of the country's major electric utilities commencing with the year 1937, with a factual statement showing the financial progress of the industry since the institution of uniform accounting and other controls. Copies are available without charge upon request.

STATISTICS OF NATURAL GAS COMPANIES - - Presents for each natural gas company (as defined in the Natural Gas Act) detailed statements of the balance sheet; income and earned surplus accounts; operating revenues, customers, and sales; operating expenses; gas utility plant investment; gas account; and certain physical property data. Issued annually. - $2.00.

ELECTRIC UTILITY DEPRECIATION PRACTICES - - Presents data on electric depreciation expenses and reserves for Classes A and B privately owned utilities with summaries by depreciation method and by type of utilities. - 25 cents.

NATURAL GAS COMPANY COST UNITS - - Presents a series of studies of natural gas company plant investment and operating expenses for Class A and Class B natural gas companies.-25 cents.

ELECTRIC UTILITY COST UNITS - - Steam Electric Generating Stations - A series of studies relating construction and operating costs to station characteristics and operating conditions.-25 cents.

STATE COMMISSION JURISDICTION AND REGULATION OF ELECTRIC AND GAS UTILITIES, 1948.-$1.00.

Publications are sold by the Commission only. Check or money order should accompany orders. Stamps are not acceptable.

COLUMBIA UNIVERSITY LIBRARIES

This book is due on the date indicated below, or at the expiration of a definite period after the date of borrowing, as provided by the library rules or by special arrangement with the Librarian in charge.

DATE BORROWED	DATE DUE	DATE BORROWED	DATE DUE
	OCT 2 6 '57		
	JUN 6 '58 STAFF		
MAY 1 0 '60 STAFF			
		JUN 11 [illegible]	

C28(955)100MEE

Gaylord
PAMPHLET BINDER
Syracuse, N. Y.
Stockton, Calif.

D550
Un3836

U.S. Federal Power Commission.
Electric utility cost units. Steam electric generating stations.

OCT 2 6 '57

S. R. King
316 W105
New York 25, N.Y.

JUN 6 '58 STAFF

Wes Henassa
Judy Zuckerman
301 Eng
Closou 40605

MAY 1 0 '60 STAFF

JUN 11 [illegible]

MC 83055
380 RSP
035596

COLUMBIA UNIVERSITY LIBRARIES
0041404513

MSH 03749

NEH [illegible]

BOUND
[illegible]

END OF
TITLE